UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

*SILAS CALHOUN and EMILY CALHOUN, Individually and as Parents and Next Friends of ESTELLA CALHOUN Plaintiffs vs. *UNITED STATES OF AMERICA Defendant	*	CIVIL ACTION No. 04-10480-RGS

BEFORE THE HONORABLE RICHARD G. STEARNS
UNITED STATES DISTRICT JUDGE
BENCH TRIAL DAY FOUR
April 12, 2007

APPEARANCES:

SUGARMAN, ROGERS, BARSHAK & COHEN, P.C., (By Michael S. Appel, Esq.) 101 Merrimac Street, Boston, Massachusetts 02114-4737, on behalf of Plaintiffs

UNITED STATES ATTORNEY'S OFFICE, (By AUSA Anton P. Giedt and AUSA Karen Goodwin) J. Joseph Moakley Courthouse, 1 Courthouse Way, Suite 9200, Boston, Massachusetts 02210, on behalf of Defendants

Courtroom No. 2
1550 Main Street
Springfield, Massachusetts 01103

JAMES P. GIBBONS, RPR/RMR
Official Court Reporter
1 Courthouse Way, Suite 7205
Boston, Massachusetts 02210
(617) 428-0402

beginning of his note, he goes on to really specifically describe what he is seeing on the MRI studies, and clearly he's reporting to us that he does not see any evidence of venous infarction.

Q Now, yesterday, and again you stated it again just now, that you went through all of those notes of Dr. du Plessis and very kindly critiqued his technique and his notes. You're aware that Dr. du Plessis, by the way, is a specialist in neonatal neurology?

A Yes, I am aware of that.

Q And he is a practitioner at Children's Hospital here in Boston?

A Yes.

Q And it is the primary pediatric teaching hospital of the Harvard Medical School?

A Yes.

Q And it sees a high volume of pediatric patients?

A Yes.

Q World famous, isn't it?

A Yes.

Q And yesterday you said several times some notion about a lag, that I think -- let me see if I'm stating it correctly.

You said that if there was a significant neurological injury, he would not, there would not be any lag in the onset of symptoms; that is, that symptoms and

problems would manifest close to the time of injury and continue, and then sort of not just spontaneously show up later.

Did I state your opinion correctly?

A Yes, you did.

Q And then you went to the note of Dr. du Plessis on -- it's on page 291. That would be his note of March 28, 2001, correct?

A That is correct.

Q Now, prior to that note and as you went through this in quite a bit of detail, her developmental and neurological exam for months had been completely normal, correct?

A That's correct.

Q And no problems were noted with head size or any of her nerves or any of her movements prior to this time, correct?

A That is correct.

Q I want to direct you to the last paragraph of that page.

Are you there?

A Yes, I am.

Q It says, "Overall we are very pleased with Stella's progress. She has done wonderfully without seizures since the newborn period. Her development is appropriate if not advanced for her age. She has a normal neurological examination, except for very mild posturing of the left upper extremity with running and walking fast that is likely

a result of the right thalamic hemorrhage in the newborn period," correct?

A That's correct.

Q Did I read that correctly?

A Yes.

Q That had never been seen before?

A That's correct.

But in this instance what they're noticing is she's posturing her arm when she runs, and she's not going to be able to run until she is about 13 months of age.

Q Precisely. Precisely.

A But if she did have some type of stroke or infarct to her brain, which does carry a worse prognosis, which is reported in the literature, then you would expect her to see either some type of agonizing pain on the other side of her body, which is well recognize as a thalamic syndrome. A thalamic stroke should causing agonizing pain to the opposite side of the body.

Now, if --

Q Doctor, thank you. You made your point.

But the point I want to get at here is from Dr. du Plessis's note, that in his opinion on that day, a neurological finding which had not appeared until after actually she was ten months old and started walking now appears, and he attributes it to the fact that she suffered

a right thalamic hemorrhage in the newborn period, not an infarction or anything like that.

So this is a lag there, sir, a sign that did not come out until she reached the developmental stage in which this would likely manifest; isn't that correct?

A In this situation where we find a mild posturing of the left arm when she is running, it is true you wouldn't see it until she's able to run.

But what I'm stating is if she had the symptoms of a thalamic -- a more serious injury to her thalamus, which would be a stroke to her thalamus, then she would be experiencing pain in the opposite side of the body; and clearly those types of symptoms would be recognizable even at an early age, not just when she's running or not just when she's walking.

Q Sir, none of the doctors here attribute -- from my review view of the record, and correct me if I have it wrong, none of these doctors attribute her problems to a stroke?

A This problem -- I would agree. The posturing of the left arm is probably due to a tiny amount of blood in the opposite -- in the right thalamus. And that would make sense.

But if she had a more significant injury to her thalamus, which would be an infarct or a stroke, then you

Q He is an eminent researcher and clinician in this area; is he not?
A Yes.
Q And you're also aware of the work of Dr. Joseph Biederman, right here in Massachusetts General Hospital?
A Yes.
Q And these gentlemen are recognized authorities in the field of attention deficit hyperactivity disorder, wouldn't you agree?
A They are two of several. There are other authorities in the area, including James Swanson, Molly Malone and other authors, too.
Q I'm sure there are others, but you would clearly agree with me that Dr. Biederman, let's start with him, and Dr. Spencer, both of them right here in Boston, and they have published many articles on attention deficit hyperactivity disorder, correct?
A That's correct.
Q Now, yesterday you told the Court and everybody in this courtroom that the thalamus -- here, you even had a diagram, the thalamus, right (indicating)?
A That's not the thalamus you're pointing to sir.
Q I'm sorry. The green one?
A Yes, sir.
Q And that was not implicated at all in ADHD, right?

A (Witness nods.)
Q You said ADHD has to do with the cortex, and that the thalamus far away, far away from the cortex, is not a factor in ADHD, correct?
A My recollection is that the main area of involvement of abnormality is the frontal lobes that causes ADHD.
Q Let me give you, sir -- this is a very recent article and it's called Attention Deficit/Hyperactivity Disorder. It's really a review of the current state of the knowledge, Diagnosis, Lifespan, Comorbidities and Neurobiology and the author of the article is Thomas Spencer, Joseph Biederman and Eric Miche [ph.], Department of Psychiatry. It was accepted for publication in July 2006, and it was just recently available on line in January, 2007, okay?
MR. GIEDT: May I see a copy of that?
MR. APPEL: Sure.
Q I'd like to first direct you to page 13.
Actually, if you'd look at page 12, you can see that the context of this --
A Before you start, sir, could I address what you just originally asked me about?
Q Yes.
A One is that I would like to say that, yes, I agree that Joseph Biederman is a well-respected author in this area,

but, as you can see, this is a research article, and that this article is not in a published journal. It has not gone through the standards of peer review.

Q If you look at the front page, sir, you'll see that it's from Ambulatory Pediatrics, volume -- wait a minute.

Yes. This is copyright 2007, Ambulatory Pediatric Association and it's Volume VII, Issue 1, Supplement 1, January 2007, pages 73 to 81.

Do you see that?

A Yes, I do. That's part of my comment, is that this is not considered one of the journals that we would consider to be reliable. Considering, for example, the New England Journal of Medicine --

Q You just stated that you respect the opinions of Dr. Biederman.

So let me continue on here.

A I would like to make a point that, again, this hasn't gone through peer review.

Q All right. I accept your opinion there.

Now, let me again direct your attention to page 13, and, first of all, you recall now that Dr. Hart described what goes on here is this neuro circuitry that's involved in ADHD, and that there are several areas of the brain involved.

That's not your testimony. Your testimony is that

it's all in the frontal cortex and the thalamus is not involved, correct?

A If I recall my testimony correctly, is that based on the work of Dr. Molly Malone, 1994, that we have an understanding of the chemical imbalance of the brain. It involves norepinephrine to the right frontal lobe and dopamine to left frontal lobe and --

Q Thank you, sir.

A -- that chemical imbalance between the two of them.

Q Let me read from page 13. "Brain" -- I am going to read this slowly because it's a little complicated.

"Brain imaging studies fit well with the concept that dysfunction in frontal subcortical pathways occurs in ADHD. Three subcortical structures implicated by the imaging studies, the caudate, the putamen the globus pallidus, are part of the neuro circuitry underlying motor control, executive functions, inhibition of behavior, and the modulation of reward pathways. These frontal, striatal, palatal, thalamic circuits provided feedback to the cortex for the regulation of behavior."

Did I get that first paragraph right?

A Yes, and may I explain --

Q You'll have an opportunity to explain after I'm through reading this.

"The frontal subcortical systems pathways

associated with ADHD are rich in catecholamine" -- for instance, dopamine is a catecholamine, correct?

A That's correct.

Q -- "which are involved in the mechanism of the action of stimulant medications used to treat this disorder."

Do I have this correct so far?

A Yes.

Q It goes on to say that, "A plausible model for the effects of medications in ADHD suggest that through dopaminergic and/or neurotropic pathways, these agents increased the inhibitory influences of frontal cortical activity on subcortical structures," correct?

A Correct.

Q "Imaging studies also implicate the cerebellum and corpus callosum in the pathophysiology of ADHD." Did I read that correctly?

A Correct.

Q "The cerebellum contributes significantly to cognitive functioning, presumably through cerebella cortical pathways involving the pons and thalamus.

Did I read that correctly, sir?

A Yes.

Q Thank you.

And you also agreed with me that Dr. Barkley is also a well-recognized authority, and I have here, sir,

Dr. Barkley's most recent book. Did you read this?
A No.
Q And actually you know that Dr. Prince, who is going to be testifying in this case on behalf of the government, he's also published in this book. Did you know that?
A No.
Q Okay. So let me show you this book, and we can turn to the pages, and I'll ask you to read them.
Let's go first to page 223.
MR. GIEDT: Do you have a copy of what you're going to cite to?
MR. APPEL: Sure.
(Counsel conferred.)
Q Let me read 223. This is a chapter, by the way, of Dr. Barkley's discussing etiologies of ADHD, correct?
A Yes.
Q And he goes through -- if you go back to 220, he's now talking about neurological factors. Do you see that?
A Yes.
Q And he discusses some neuropsychological studies, and now he's going to talk about the neurological studies of ADHD. Do you see that? That starts on 221.
A Yes.
Q And the first thing he says under neurological studies, by the way, on 221 is, It's only within the past two decades

that more direct research findings pertaining to neurological integrity in ADHD have increasingly supported the view of a neuro-developmental origin for the disorder, correct?

A Yes.

Q And then on page 223, do you see that, he says if you look at the last paragraph before it gets to neurotransmitter deficiency, it says, "Others reviewing this literature over the last two decades have reached similar conclusions; namely, that abnormalities in the development of the frontal striatal cerebella regions probably underlie the development of ADHD."

He then cites several studies, and then says, "These reasons are shown in 5.1."

And if you turn to --

MR. GIEDT: What part of the page -- what did you just read from? I'm sorry.

MR. APPEL: Right down there (indicating.)

Q And I will show you -- if you turn to the next page in your book, you will see diagram 5.1.

MR. APPEL: And, your Honor, if you would like to just see this diagram.

(Document handed to the Court.)

Q And it says, "Figure 5.1. Diagram of the human brain showing the right hemisphere and particularly the location

of the striatum, globus pallidus, and thalamus."

Did I read that correctly?

A Yes.

Q Now, you also talked about environmental and psychosocial factors, did you not?

A Yes.

Q And let me go back now again to Dr. Barkley right in your book there on page 219.

And right on the very first paragraph, I'm going to start about seven lines down, "There is even less doubt now among senior investigators in this field than there was at the time of the preceding edition that although multiple etiologies may lead to ADHD, evidence points to neurological and genetic factors as the greatest contributors of this disorder."

And then he goes on to say on the next column -- same page, next column -- "Just as important is the fact that in the past decade no credible social environmental theory or even hypothesis concerning causation in ADHD has been developed that either is consistent with the known scientific findings on the disorder or has any explanatory or predictive value for understanding the disorder and driving further scientific research and testing it." And talks about falsified abilities. "And given what is now known, nor could there be, because studies of twins and

families have made it abundantly clear this the majority of variation in the behavioral traits constituting ADHD is the result of genetic factors. What little variation remains is best explained by unique events that befall the individual child, often prenatally and are not shared by other members. Those events include biological non-genetic hazards that cause neurological injury, alcohol and tobacco exposure during pregnancy, premature delivery especially with minor brain hemorrhaging, early lead poisoning, stroke, frank brain trauma, to name just a few."

So I did read all of that correctly, sir?

A You did, but you read it in bits and pieces.

Q Well, you're welcome to pick out whatever other pieces of this that you would like to read.

A What I would like to point out is that what you're doing is you're reading bits and pieces of it, and it doesn't hold together for one important reason, is that the main area that's involved in ADHD is the frontal lobes, and if it is involved at all with the thalamus, than it must be involved in the dopamine circuitry, which is what you pointed out in your readings. And the crucial point here is that the dopamine system is on the left, which has been confirmed by Dr. Molly Malone in 1994, and in this situation if the thalamic hemorrhage could even theoretically cause a problem to the dopamine system, it's on the wrong side. It's on the

disorder?

THE WITNESS: Yes, sir.

THE COURT: Going to the general theory of causation, is it your position that the type of injury suffered by Estella could never cause ADHD, or it did not cause ADHD in her case?

THE WITNESS: In her case, sir, I would say that it could never cause it because it's on the wrong side of the brain.

THE COURT: Because of the left side?

THE WITNESS: That's correct, sir.

THE COURT: That's what I understood. I wanted to make certain I had it straight.

This has nothing to do with the case at hand, but I was very intrigued with your explanation of chemical imbalance as an explanation for ADHD, and you explained to us what happens under the hypothesis when norepinephrine is the imbalanced agent.

What would happen if the dopamine were the imbalanced agent?

THE WITNESS: If it's only the dopamine that is imbalanced, that is known as Parkinson's disease.

THE COURT: Okay.

THE WITNESS: So you would have a lot of motor disability.

because this is how it appears on an MRI. An MRI always reverses it. The right side is on this side, and the left side it on the opposite.

And this would be the frontal lobes here. Right in this cleft right over here is where the vein, the sagittal vein, would sit outside the brain but right in between here, and then you can see here that this would be the thalamus. So it's this deep structure right in here.

And then on the other side, what I attempted to show was again the right side, the left side, and then right here, if you recall from seeing what Dr. Grant was showing us, this would be the tiny spot of the punctate hemorrhage in the thalamus.

So to answer Mr. Giedt's question, the thalamus -- there's two of them, one on the right and one on the left, and it's this deep structure.

The function of the thalamus, or the anatomical function of the thalamus, is a station where information crosses through. And the main information that crosses through this area is all peripheral sensory information. But mainly the two areas of sensation are pain and temperature, and so what we know about this area is that if there has been a stroke to that area or an infarction in that area, it's a very well-described syndrome. And what I'm quoting from is from Mantra [ph.] and Gants [ph.], the

Neuroanatomy Textbook, and that a thalamic stroke or thalamic syndrome is characterized by intense burning and agonizing pain, which typically occurs after a thalamic infarction to the opposite side of the body.

But there is no indication from the textbooks that a thalamic infarction should cause behavioral problems or attention deficit disorder or any learning disorders.

What we know now about our current knowledge of ADD is that it's involved here in the frontal lobes. It's involved in some kind of circuitry that Dr. Hart was referring to or some type of abnormality in the frontal lobes here. And as you can see from this picture, the frontal lobes are very far away from the thalami or thalamus.

Q Once again will you explain that one -- excuse me, the thalamic syndrome?

A Yes.

Q And that occurs with a stroke; is that correct?

A That's correct.

Q Did Estella have a stroke?

A See, in my opinion, and I think Dr. du Plessis and Dr. Sidhu characterized it correctly, that she probably had this tiny right thalamic bleed which was evidenced by this posturing of her left arm when she ran. And if she were to have a stroke or an infarction of that thalamus, which would

severe brain injury. That's the severest form. But you can also have temporary conditions, such as a seizure where you completely lose consciousness but you have no brain injury, no infarction to your brain, and the seizure itself won't cause any brain injury either.

So you can have varying degrees all the way from a seizure, which is temporary with no brain injury, all the way to coma where you're completely out and probably due to a very severe brain injury.

Q And Dr. Hart referred to the thalamus as a way station in general terms, and could you -- I think you touched on it little bit before, but in the context of how Dr. Hart described it, do you agree with his assessment of it?

A I did not agree in the sense that the thalamus is a station. In other words, things pass through there. Information passes through. But the main information that passes through is the peripheral sensory receptors, namely, temperature and pain. That's the main information that passes through there.

And I believe Dr. Hart was implying that circuits through the -- that would be involved in ADHD somehow go through there. And in my opinion there is no literature that supports that. The main area of the brain that's involved in ADHD are the frontal lobes, not the thalamus.

Q Now, Dr. Hart made a reference to Phineas Gage